# THE CONCEPT OF BARRIER FREE IN HEALTHCARE SPACES: LABOUR DELIVERY ROOM DESIGN CASE STUDY

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Abstract:

*Healthcare spaces is one of the earliest spaces where barrier free concept of space design is being accepted and regularised as part of the essential building requirement. Spaces in healthcare buildings support activities that support the function of making ease in the delivery of care to sustain live and care for the decease. The paper introduces the subject of healthcare spaces and through case study illustrate step by step how designers – architects and the user clients approach design of the space, using the various available guidelines to produce the first draft drawing, conduct post occupancy evaluation (POE) and following analysis of POE adapt the design for approval and construction. For the purpose of demonstrating the concept of barrier free in healthcare spaces, labour delivery room designs of several hospitals are being selected as the case study. A qualitative research approach was adopted for this study. Literature review on the process of design and activities of labour were conducted prior visits to selected facilities for observation on its usage. Interview of the main players in the design decisions were made pre and post visit where relevant. The paper concluded that this is one of the many spaces in healthcare buildings that support the process of healing or bearable for many ailments and diseases that address physical and mental condition of a person. Each space has its own general and specific requirements to which designers need to understand and provide as appropriate. Barrier free concept is not only for the disable but for the able to support the disable at the time of crisis.*

Keywords: *barrier free, labour delivery room, space*

## INTRODUCTION

*"There shall be no infliction of harm on oneself or others"* hadith

Many new terms and terminologies were made almost on daily basis by connoisseurs or people-on the move as highlights and spotlights to give widespread picture on what is trendy and what should be the one to follow in various field and interest for whatever purported purposes. Combination of creativity and communication information technology in the industry had led to many allege “barriers” being no longer an excuse. In the construction industry and architecture per se, the meaning of the word “vernacular” that addresses the effectiveness of the local construction, technology and material of the built environment with a dash of culture to give it a meaningful representation, has then be termed and relook as a “sustainable” built environment which new technologies has coined it as the real “Green” architecture. Barrier free environment which was developed from the process of providing

facilities for the disable-persons too has not been spared. Although it started as a dutiful requirement for designers as stated in the building by-laws for all building types, the actual provision of this requirement had been sidelined for so long. Social ignorance and lack of awareness led us to provide only for the normal able-bodied person as the norm. Quest for design excellence had always been with superlative and trendy undertones disregarding certain section of the society to share its enthusiasm.

The United Nation declared 1980 as UN "Decade of Disabled Persons" was followed by many other declarations. Awareness on the provision for people-with-disabilities with the revision and launching of guidelines were even felt in little Malaysia. Since current IPAD IPOD generation loves "in-thing" out of the web, the need for "barrier free" designs and "barrier free" environment has been re-hatched from designs for the handicap for the disable - bodied person as a design requirement. The requirements is no longer an inclusive clause but should be naturally embedded in the design process as a second nature, hence the coining of the term "Universal Design" or UD.

Healthcare environment, on another hand has been noted for its intricacies and complexities that deal with handling of illnesses and diseases since ancient times. The care of the ill was and still is imbued with spiritual and intangible explanation although the advent of science had proven the cause and effect of health on a person. In the provision of a caring environment for the ill person, through evolution brought about through nursing care, medical technology, clinical research and evidence based healthcare design, details and consideration of "barrier free" for the "disable" is naturally taken on board. Expected physical barriers to caring environment were gradually improved and in place in healthcare facilities through the provision of guidelines, best practices and healthcare services acts as an accredited requirements for quality of care. Spatial provision including critical dimension for particular clinical activities, inter and intra circulation, mode of transport, distance and adjacencies of related facilities are among the crucial consideration towards barrier free design in healthcare spaces and architecture. Towards one design fit all, Universal Design, where possible and appropriate were considered.

This paper aims to highlight the similarities and differences healthcare spaces have to Barrier Free design considerations by those participants involve in various stages of implementation in the building industry i.e. design professionals, students, decision makers as well as users of the built facility.

A qualitative approach using case study was adopted for this study. The design process on Labour Delivery Room (LDR) of a Labour Unit for Ministry of Health Malaysia hospitals was chosen. Through own experience as architect cum health facility planner, the study illustrate step by step how designers – architects and the user clients approach design of the space, using the various available guidelines to produce the first draft drawing. In confirming the quality of space designed, the architect conduct post occupancy evaluation (POE) of the LDR of the Labour Unit from selected hospitals in Malaysia. Following the analysis of POE's findings and upon clarification via discussion with the users (the hospital staff) and facilitators (Ministry of Health), the architect will adopt and adapt the design for approval and construction. For this study, the POE to selected hospitals were conducted to record available spaces of the Labour Unit, the layout of the unit, circulation pattern in the unit from patient arrival/entrance to exit, take onsite measurement of spaces, openings and furniture; record patient flow, how patients were transported or coming into the labour delivery room, record and measure space taking instruments, conduct random interviews on staff, patient and maintenance/janitorial staff (where available), record number and types of staff-users and their activities; the actual utilisation of the designed birthing space. In this study salient features of barrier free design considerations were demonstrated explicit and implicitly.

Barrier free design for healthcare spaces indeed goes beyond the provision for the physically disable and impaired but required to also include caring for those with psychological and spiritual traumas dealing with life and death from the moment they set foot in healthcare facilities. The significance of this study, as presented in this paper, however small, is to illustrate LDR as a physical facility and one of the many types of healthcare spaces that cares for the users in its design considerations. It is to inform and illustrate that detailed process need to be conducted even for a single space as representative of major areas of healthcare spaces and facilities in a nutshell (refer Fig 1). Fig 2 illustrate the factors contributing to the making of the space for the said function.

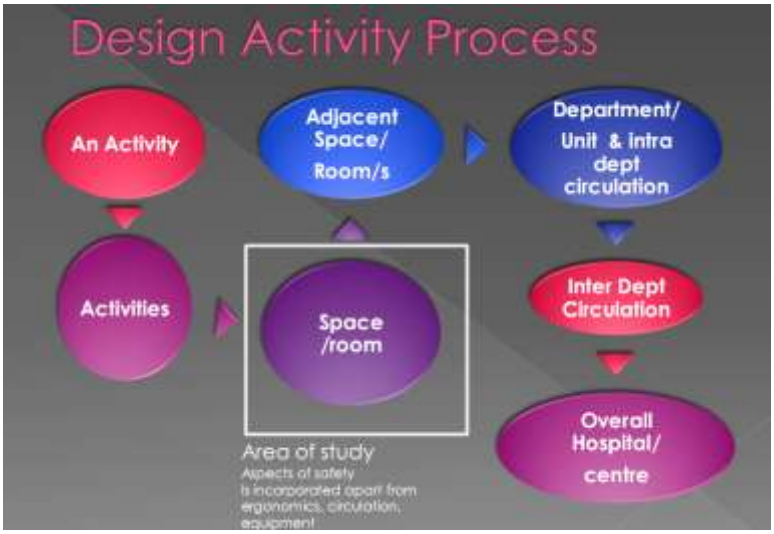


Fig. 1 Design Process of a Healthcare Facility


Fig. 2 Illustrate the factors affecting the space configuration of healthcare spaces

## CONCEPT OF BARRIER FREE IN HEALTHCARE SPACES

- What is Barrier-Free concept?
- What is Universal Design?
- What are the characteristics of barrier free concept as universal design and elements of barrier free in healthcare spaces?
- How is it implemented in healthcare environment (facilities and spaces)?

Although much has been said and defined on Barrier Free, let us dwell a moment to literatures on the matter.

The **Convention on the Rights of Persons with Disabilities,** adopted by the United Nations General Assembly and came to force in 3 May 2008, is based on a social model of disability, and defines disability as including " *those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others."*

*On accommodation, the* Convention defines it as "reasonable accommodation" to be "necessary and appropriate modification and adjustments not imposing a disproportionate or undue burden, where needed in a particular case, to ensure to persons with disabilities the enjoyment or exercise on an equal basis with others of all human rights and fundamental freedoms" at the Article 2 and demands this all aspects of life including inclusive education". The Convention stresses that persons with disabilities should be able to live independently and participate fully in all aspects of life i.e. to ensure that persons with disabilities have access to the physical environment, to transportation, to information and communications technology, and to other facilities and services open or provided to the public (including healthcare).

On health, Article 25 of the Convention specifies that "persons with disabilities have the right to the enjoyment of the highest attainable standard of health without discrimination on the basis of disability. Article 26 of the Convention affirms that effective and appropriate measures, including through peer support, to enable persons with disabilities to attain and maintain maximum independence, full physical, mental, social and vocational ability, and full inclusion and participation in all aspects of life..... that warrant the States Parties to organize, strengthen and extend comprehensive *habilitation and rehabilitation* services and programmes, particularly in the areas of health, employment, education and social services, in such a way that these services and programmes begin at the earliest possible stage,... including promotion of the availability, knowledge and use of assistive devices and technologies, designed for persons with disabilities related to habilitation and rehabilitation. McGraw-Hill Concise Dictionary of Modern Medicine. © 2002 states in the online The Free Dictionary (retrieved 25Oct2011) that *Barrier Free* is pertaining or referring to structural or architectural design that does not impede use by individuals with special physical needs.

Wikipedia the Free Encyclopedia (retrieved 27oct2011) states that *universal design* (UD) refers to broad-spectrum ideas meant to produce buildings, products and environments that are inherently *accessible to both people without disabilities and people with disabilities*. The principles of universal design as expounded by The Center For Universal Design At North Carolina State University, is broader than barrier-free design and accessible design as it includes *equitable use, flexibility in use, simple and intuitive, perceptible information, tolerance for error, low physical effort and size and space for approach and use.*

**What are the characteristics of barrier free concept as universal design and elements of barrier free in healthcare spaces?**

Most literature and in practice interpret the characteristics of barrier free concept on universal design as "designing for all" and not just for the disable persons. Designing for all includes designing for everyone, in whatever physical states and conditions, age group, gender, culture or even beliefs. In healthcare spaces, the barrier free concepts takes shapes in all public areas of the premise where people moves, sat, stand and meet; in all administrative areas where workers convene in their daily chores; all patient areas with added requirements for their specific impairment where patient, staff and equipment interact in one off and day to day routine of history taking and examinations; and in all support areas (clinical and non clinical area) where humans play an important role to prevent accident and error in their execution of noble work. Apart from physical considerations, in healthcare spaces, barrier free includes another dimension in design towards preventing errors and accidents frequently associated with healthcare environment due to staff fatigue and latent conditions (i.e. "adverse consequence which may lie dormant within as system for a long time, and only becoming evident when combine with other factors to breech the system's defences such as poorly designed facilities.." – Reiling.J (2007). *Safe by Design*, pg5). These areas and its characteristic are recognisable by the need to access safely and efficiently in their work process. Such areas and barrier free factors are listed, not in particular order, as follows:

(i) Physical Width, Height and Openings

1. Circulation spaces such as corridors, stairways and doorways, in between furniture, waiting chairs, reception, beds, treatment couch, dental operatories, diagnostics equipment, with no encroachment or protrusion of structure or movable equipment on the sides or from the ceiling/top and any direction that will impede accessibility;

2. Rooms i.e. patient room, treatment room, toilets, diagnostic rooms, examination rooms, counseling rooms, operating rooms
3. Equipment and Furniture i.e reception and registration table, dining table, telephone booth, sanitary fittings,

(iii) Visibility

1. visibility of stairways, drops and corners,
2. visibility of impending ceiling, wall and floor mounted equipment,
3. visibility of monitoring through glass / window openings of doors, screens, wide area such waiting area for patient conditions by staff
4. visibility for respite at corridors, waiting area, patient room, social areas to nature
5. visibility to signage and directions

Other considerations include Audibility, Tactile/Sense of Touch, Ergonomic and perhaps Smell (eg. of drugs for Pharmacy, and of food for the Cafeteria and kitchen for the blinds and vision impaired).

The list is not exhaustive and may vary from site to site depending on the situation and emphasis made by virtue on the nature of the project.

The scope is very wide and design implementation may not be economical for certain building typology and use which therefore warrant a definite guide to what, where, for whom, why, and how it should be implemented. As CAPITAL COST became a matter of concern in its wide implementation, the minimum requirement stipulated in various legislation decrees in various countries became the common yardstick in the implementation.

**How is Barrier Free implemented or interpreted in Healthcare environment?**

United States Department of Veteran Affairs, Office of Construction and facilities Management in 1968 under Architectural Barriers Act, Public Law 90-480, ensured that buildings financed with federal funds were to be so designed and constructed so as to be accessible to everyone. The Americans with Disabilities Act (ADA) of 1990 called the ADAAG Standards set accessibility requirements for state and local government, as well as

private sector projects, similar to the requirements set for Federal projects through the Architectural Barriers Act. In 2004, this Act was replaced with the Architectural Barriers Act Accessibility Standard (ABAAS) for Federal Facilities. As hospital or healthcare environment account for more than the general percentages of population as provided in the general ADA –ABAAS guidelines for the provision of general facilities for the disable, a supplementary guide, the Barrier Free Design Guide, to meet the needs of the Department of Veterans Affairs in its health care facilities, were issued in August 2011 to replace existing pages of the VA Barrier Free Handbook (H-08-13).

In the United Kingdom, the Department of Health (DH), the Department of Health, Social Services and Public Safety (Northern Ireland),Health Facilities Scotland, NHS Wales Shared Services Partnership – Facilities Services (NWSSP-FS), which can reached at this website **http://www.spaceforhealth.nhs.uk/**, are responsible in the provision of the relevant technical guidelines/ manuals to design professionals and users in the making an effective healthcare facilities. These technical guidelines which consist of space requirements for single activities to multiple activities to standard design as guidelines to highly clinical areas can be bought and downloaded from the site in the form of Health Technical Memorandum (HTM), Health Building Notes (HBN), Activity Data Bases (ADB), Design Briefing System (DBS) and Healthcare Premises Costs Guides (HPCG) among others. These guidelines came with instructions on how it is to be used by designers, taking note of its limitation and appropriateness of use so that the responsibility of the designer to conceive spaces that is accessible and therefore safe for use is not on the guidelines but the designer on site.

The Australian healthcare spaces guidelines came as Hospital Planning Units (HPU) in 1992 by Capital Works Branch, Department of Health, New South Wales that includes, as others of the US, and the UK, the natural requirements of the disable within the context of definite space standards. The standards is further develop recently (2006) to include greater Australia as Australasian Health Facility Guidelines (HFG) by HCAMC in association with the University of New South Wales, that considers the various cultures, shapes and sizes of the Australian and New Zealand population which include the indigenous people and migrants.

In the Malaysian scenario, there are no specific or additional guidelines for barrier free in the design of healthcare spaces for healthcare projects in Malaysia. Apart from the Uniform Building By-Laws (UBBL) that stated the need to comply to disable requirements of MS

1184 (2002) for all public and individual buildings in clauses that is also meant for any public buildings; all private healthcare facilities must abide to the Private Healthcare Facilities and Services Act 2006 to ensure additional requirements specific to healthcare facilities are complied with prior to accreditation and licensing by the Ministry of Health Malaysia. Public healthcare facilities, however, were exempted from the Act but cater to standards based on best practices of the time engraved in their respective project and medical briefs of requirements. The onus of ensuring that the public facility designed meet the requirement rest with the supervising team of the project on both sides of the contract signee.

## CASE STUDY: LABOUR DELIVERY ROOM

### Introduction

Healthcare facilities are made up of many sub typologies of buildings based on services and spectrum of care from primary, secondary to tertiary care as well as from *promotive, preventive, curative, rehabilitative to palliative care*. The choice on Labour Room Delivery Design as case study was based on current PhD thesis currently under study by author, on services and facilities that forms the basic part or nucleus or core of a typical hospital throughout the country. Although the thesis is taking note only on its critical dimension in the process of design, the efficient and safe circulation of the users including patients to and within the room/space denotes importance of accessibility as one of the factor in determining the critical dimension required for the space formulation.

The focus for the purpose of barrier free study in healthcare spaces are the "care process" conducted to patients, with nursing, clinical staff (medical officers/housemen and consultants/ specialist), family members, others including trainee nurses and janitors as role players in the caring environment, with equipments, furniture and services as supports. The "care process" takes care of the patient as well as staff, as caregiver, towards achieving a common goal - the disease or discomfort is in the way of healing, cured, or under controlled. For patient in labour, the "care process" in the Labour Unit and LDR is to take into account patient's initial discomfort, to manage pain, deliver the baby safely and making sure the mother and baby is "well" before transferring them to the wards for further monitoring before finally discharged.

**Design Process**

Architects are given a brief or statement of needs of the project to design apart from identifying the site and the cost. The brief is a written document that described the client's needs of a whole hospital or part of the hospital for expansion, renovation or replacement. In the brief, the organisation, the policies, the function and how the facilities should work, how it should be experienced is described. Some briefs are detailed and some briefs are very basic and rely very much on the architect's ingenuity. In some briefs, list of spaces were suggested and some, if of importance, were duly prescribed. In healthcare projects, clients take for granted that architects will take care of all the needs including attention to needs of the disable. The architects began design by illustrating preliminary concepts of the overall areas before zooming to conceptual spaces of the prescribed room-the Labour Delivery Room. The endorsement of the room design came in interactive meetings between designers and users that covers way entrance to the LDR were managed, the positioning of labour beds, the respective power and medical gas positions, the loose and fix medical and non medical equipments as well as the physical environment of appropriate lighting levels for the differing situation and procedures, appropriate ventilation system, situation during emergencies and patients' privacy. Currently, although previously taken for granted, patients' and staffs' safety as part of quality care, need to be severely addressed in the design.

The process of design takes shape after endorsement of the drawings (the plans and the 4 walls elevation of the space) to working drawings for construction. Mock ups of the room as stated as part of the requirement of the contract to verify the built up space before fixing and repeated done to other similar LDRs, were set up for the user-clients inspection. The degree of inspection and instrument use to measure it usability is questioned as there were no specific method mentioned in any of the said exercise on site, apart from visual, physical usage and dimensional inspection at the discretion of the approval authority. The inspection of the room as per designed and agreed upon in the Room Data interaction as well as the mock up session, were again repeated during the commissioning stages of the building. In both situations, apart from observant nurses and staff who speak out for the patient in their care, the patient, as the "disable person" in this scenario is not consulted at all, but taken for granted as the willing participant of an orderly clinical environment for safe labour and delivery of her baby before setting forth to the ward prior discharge.

For healthcare facility, the design process did not stop at handing over the building but include the process of evaluation the use facility as the next step towards improvement. In this instance, the facility, upon 6- 1year of occupancy are subjected to design and management audit for which the findings will be use to improve the current and the next project. Barrier free requirements as used are deducted from these study visits.

**Labour Unit of a Hospital – Planning criteria**

Labour delivery room or LDR is part of the Labour Unit of a hospital with many other core and supporting spaces to function as a comprehensive delivery centre or unit that is patient, husband and baby friendly. The Labour Unit of any hospital has a reception for patients either in-house from inpatient maternity or antenatal ward of the same hospital and/or coming directly from home or other health centres through emergency entrance specially identified for Labour. The location of Labour Unit's entrance is usually next to the Emergency Department's entrance which is accessible by car and found intuitively by the major public.

The Labour Unit, ideally should be on the "ground level" or level accessible by vehicle to ease means of access direct by birthing mothers/patient to the department for appropriate treatment/management. However, not all project sites, due to conflicting priority of "ground level" accessibility by all other departments such as Emergency, Orthopaedic Clinic, Rehabilitation Unit as well as support service departments, could locate the Labour Unit on the ground. Thence we have the labour Units on 1$^{st}$, and upper floors that requires additional signage, corridors and accessibility of lifts and other vertical transportation to bring inpatient and outpatient needing emergency management into the design.

The case study chosen on LDR of the Labour Unit as a post occupancy evaluation (POE) is the result of the project process cycle as in Fig 3. For the purpose of the barrier free study of the healthcare facility, a few local hospitals were selected for observation of the LDR as used.

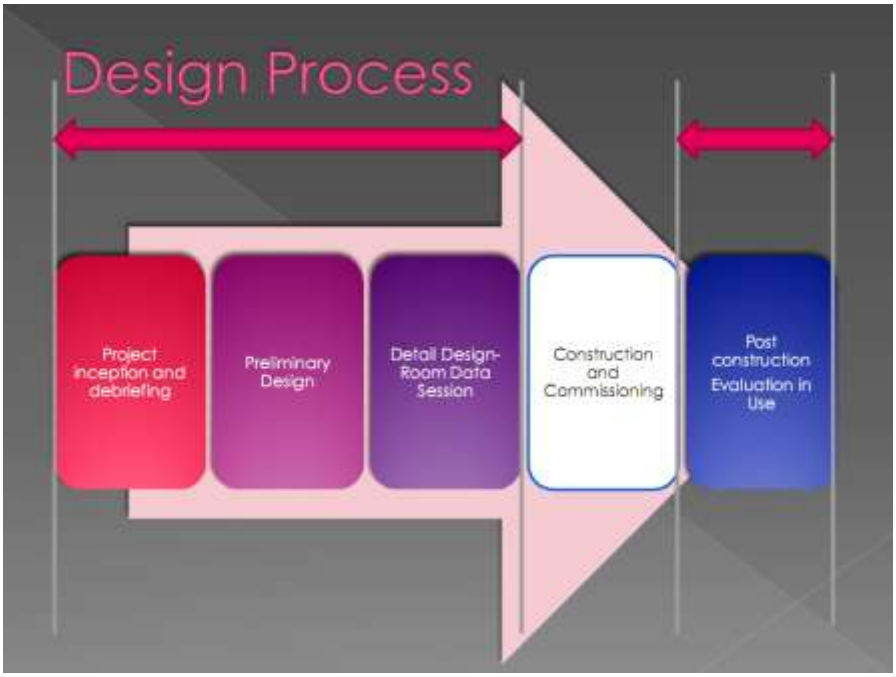


Fig. 3 Illustrate the Health Facility Project Cycle for Which Designs are Evaluated upon Occupancy and Use.

**The Post Occupancy Evaluation of the Labour Delivery Room**

The methodology approach to the study includes the following checklist

- Literature review on which method of POE to use for the study.
  - Walk in
  - Diagnostic
  - Other
  - Revised

For each venue visited

- Check Brief (of the project)
- Check drawings ( as built preferably over tendered drawings)
- Prepare Interview Checklist ( for working staff (including janitors) and specialist)
- Prepare observation list
- Prepare equipment notation list
- Prepare list of staff and its category to be interviewed
- Visit facility ( after preparing what needed to be observed and collected)

- Observation of process on site
    - Note and measure space area ( Length, breadth, height)
    - Note and measure openings, distance from bed, furniture and equipment
    - Note and measure loose and fix equipment, furniture
    - Note finishes, colour, location of windows, doors,etc
    - Note Role of staff
    - Note and measure location of building services (M&E)
    - Observe movement, transaction, barriers (protrusion, distance),etc

- Organisation of data
    - Redraw sketchy sketches to autocad (in real scale) and write actions as in use for notation
    - Transcribe the interview notes as confirmation to what was observed
    - Write other observations and findings

- Analysis of data

    On circulation, space and safety

    - Transport of patient ( from the car(if outside) or inpatient ward ( from antenatal ward) to the LDR via wheelchair, on foot or on stretcher trollies)
    - Movement of patient ( from registration to place on labour bed in the LDR, from birthing process till transferred back to the ward with baby)
    - Movement of baby and staff
    - Movement of spouse
    - Movement of staff ( many category of staff, sizes and function)
    - Movement of equipment (loose)

    On ergonomic and anthropmentric

    - Design of furniture and user reaction

- Discussion and Findings

  Qualitative and quantitative output of the process with relevant diagrams and tables explaining the observation made to each of the actions taken in all the LDRs visited
- Recommendations

  For design improvement
  Safety measures

The observations made on upon the visitation were analysed using measured to scale pictorial diagrams with notations on its every action in use.

Sample of the pictorial diagram based on the initial sketches on site is illustrated in Fig 4. Barriers to efficient access to the facility by staff, patient and even the spouse in the use of the facility is noted and recorded.

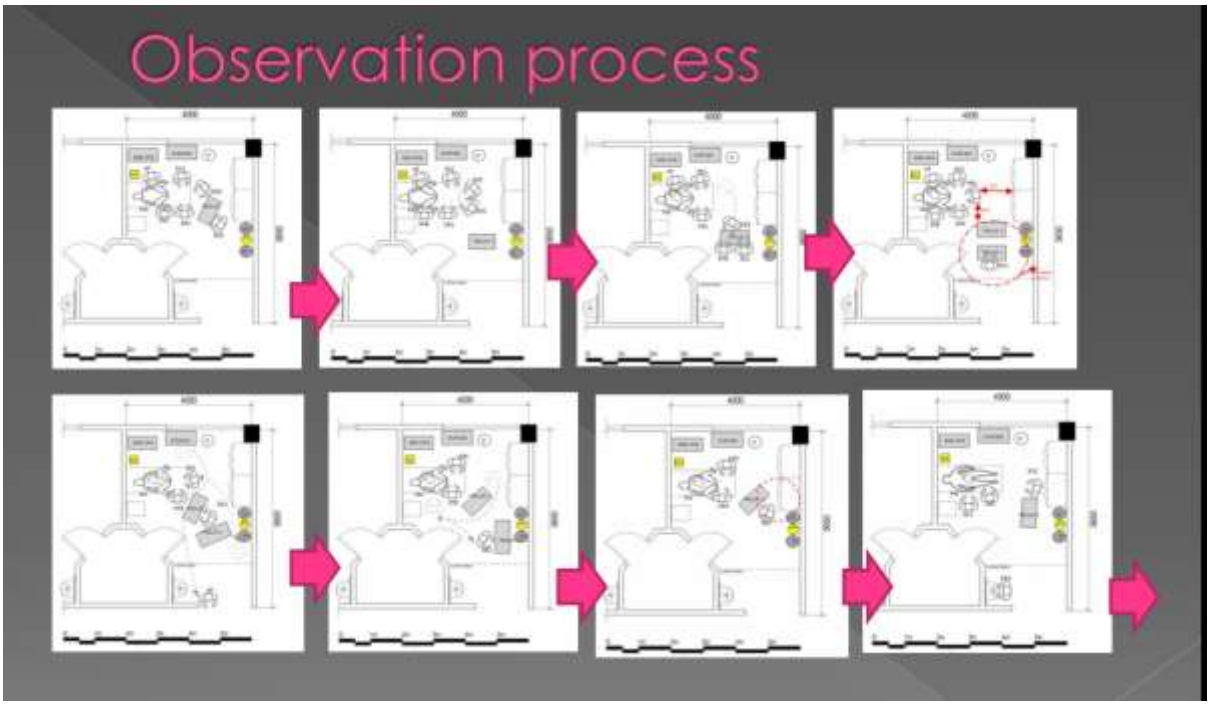


Fig. 4 Pictorial diagram of the LDR space in one of the local hospitals in the country

**CONCLUSION**

Differences in the concept of barrier free in general building to healthcare apart from universal acceptance is on **how the facility should function efficiently, safe and comfortable when in use**. Special care for the patient as "disable person" either temporarily

or permanent in the premises are noted in the special requirements of the facility such as bigger and wider spaces for Orthopaedics, more guide rail for the vision impaired and blinds; the use of colours for legibility, the tactile messages on stairway and guide rail. Healthcare environment especially hospitals are manned areas. Disable persons as patients, if they are non-ambulant are assisted in many ways through man, machine or by design. Healthcare spaces do not only deal with physical barrier but also infectious disease that needs a different kind of barrier and yet leaving the man as human humane and care for in every possible way. The need for research in this dimension of barrier free is open and perhaps in future, we will see a healthcare facility that is truly barrier free.

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Other.